

ABSTRACT OF THE DISCLOSURE

A Contact Image Sensor (CIS) system with high resolution, high sensitivity, low noise, low-power dissipation, and low-cost scanning has a CIS pixel structure that utilizes a junction photodiode as a detector element and a single-stage, high-gain, low-power inverter functioning as a charge integrating amplifier. The inverter clamps the photodetector at a fixed bias voltage and removes any signal charge generated by the incident light. A very small integrating capacitor is used on the integrating inverter amplifier for high pixel gain. The pixel further includes a noise cancellation circuit to eliminate the reset noise of the integrating capacitor. The pixel signal is then read out by a differential stage to cancel the dark offset. This structure allows the implementation of high-performance CIS arrays using low-cost standard CMOS manufacturing process. Furthermore, the present invention allows easy implementation of a lower resolution array with higher sensitivity and scanning speed and as a result, an array with user controllable resolutions can be realized. An interdigitated array structure is used to enable the array to have high sensitivity (three times that of prior art arrays) with smaller chip size. The interdigitated array can be manufactured using a trailing-edge CMOS process with lower cost than conventional contiguous arrays. The interdigitated array structure also permits the implementation of a user controllable multi-resolution scanning system.